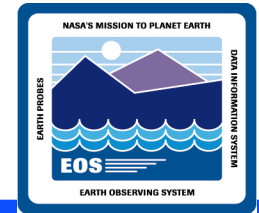


SCIENCE SOFTWARE INTEGRATION & TEST

**ECS Version 2 Training
(updated for drop 5B)**

625-CD-516-002

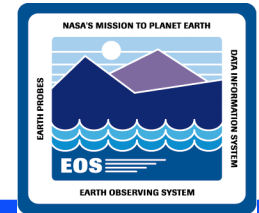
Science Software Integration and Test (SSI&T) Overview



WHAT ECS SSI&T IS

- SSI&T is the process by which science software developed by Instrument Teams at local SCFs is tested and integrated into the ECS at the DAACs.
- The scope of SSI&T for pre-launch releases covers activities starting with delivery of the science software to the DAACs and ending with either the successful integration of each delivered PGE into ECS or the scheduled end date for SSI&T support.
- SSI&T is a team effort which can only be successful in the allotted time if all groups cooperate.

Science Software Integration and Test Overview

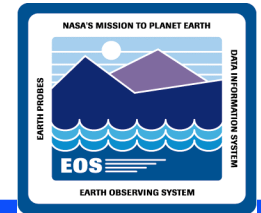


WHAT ECS SSI&T IS NOT

- SSI&T is not validation of science algorithms that are incorporated into PGEs which produce science data products.
- SSI&T is not validation of the science data produced.
- Although the Operational Procedures are written as checklists of menu driven activities, SSI&T is not a turnkey process which can be run by test personnel who have no knowledge and experience related to science software development and data processing.
- SSI&T is not a simulation of production.

SSI&T Training Objectives

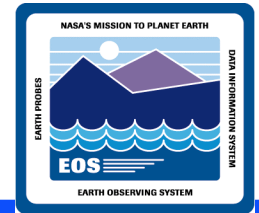
Day 1



- **Overall: Provide the proficiency to integrate and test science software into EOSDIS**
 - **Release 4 Architecture Overview**
 - **The ECS Assistant**
 - **Preparation and Setup - alias file**
 - **Review of Science Office Project Instructions (at:
http://dmserver.gsfc.nasa.gov/proj_instr/sopi_index.html)**
 - **Acquiring and Unpacking Delivered Algorithm Package**
 - **Performing a DAP Acquire Using SSIT Manager**
 - **Science Software Configuration Management**
 - **The SSIT Manager**
 - **Standards Checking of Science Software**
 - **Compiling and Linking Science Software**
 - **Running a PGE in a Simulated SCF Environment**

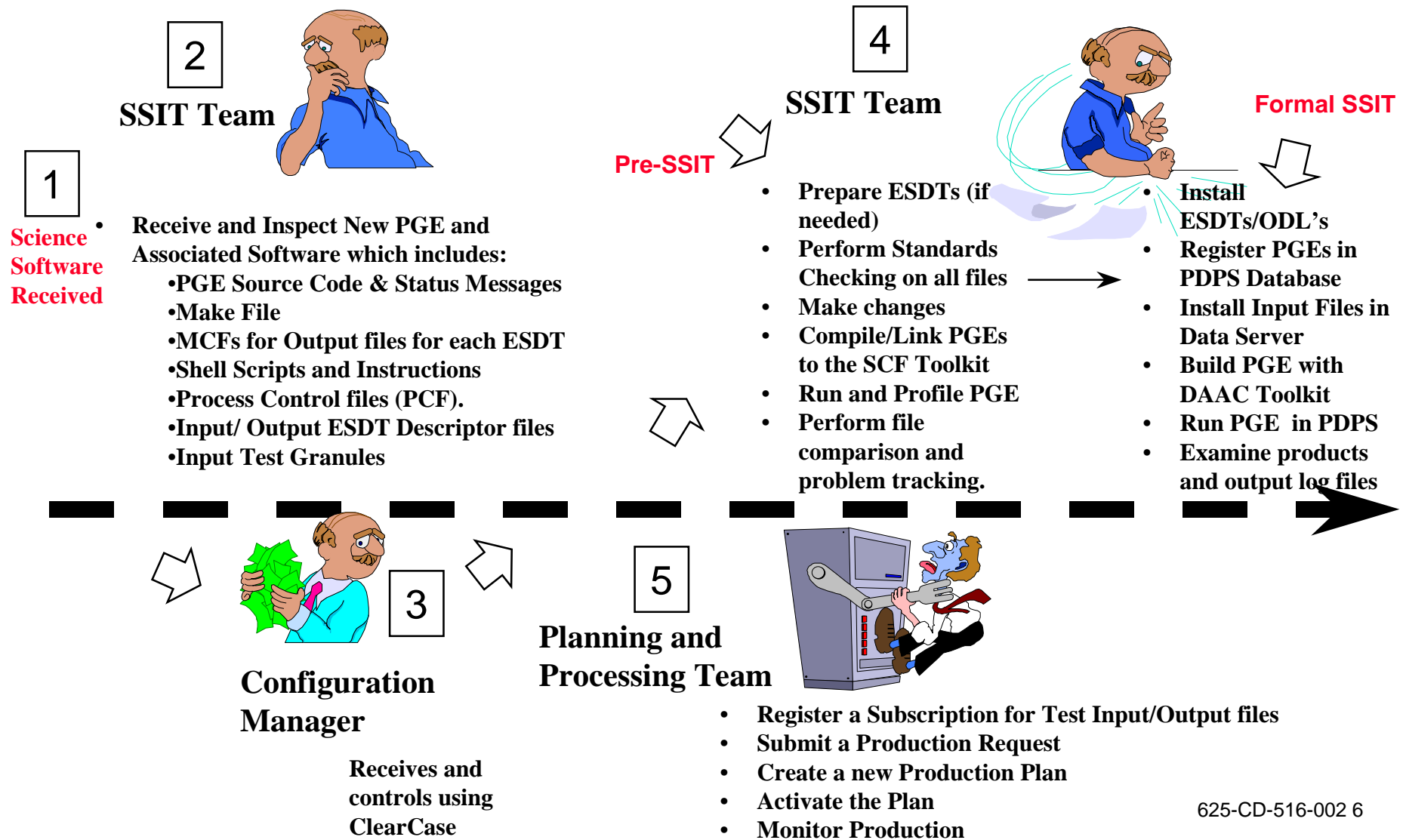
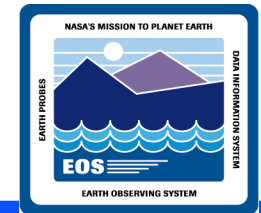
SSI&T Training Objectives

Day 2

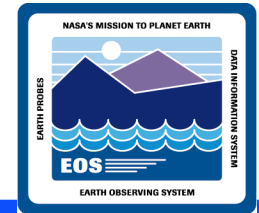


- Refer to the Post Processing and General Investigation Section for :
 - Examining PGE Produced Log Files &
 - File Comparison and Data Visualization
- Preparation of Earth Science Data Types (ESDTs/DLLs)
- ODL Preparation
- Production Rules
- DPREP
- Update the PDPS Database and Data Servers
- PGE Planning and Processing
- Post Processing and General Investigation

SSI&T Process Overview - The Big Picture



Release 4 Architecture Overview



Release 4 Architecture: Overview

ECS Subsystems

Client Subsystem (CLS)

Interoperability Subsystem “ADSRV” (IOS)

Data Management Subsystem (DMS)

Data Server Subsystem (DSS)

Ingest Subsystem “STMGT” (INS)

Data Processing Subsystem (DPS)

Planning Subsystem (PLS)

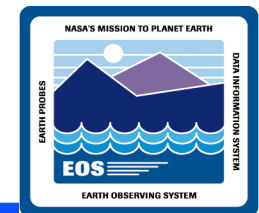
Communications Subsystem (CSS)

Management Subsystem (MSS)

Internetworking Subsystem (ISS)

Implications for SSI&T Procedural differences

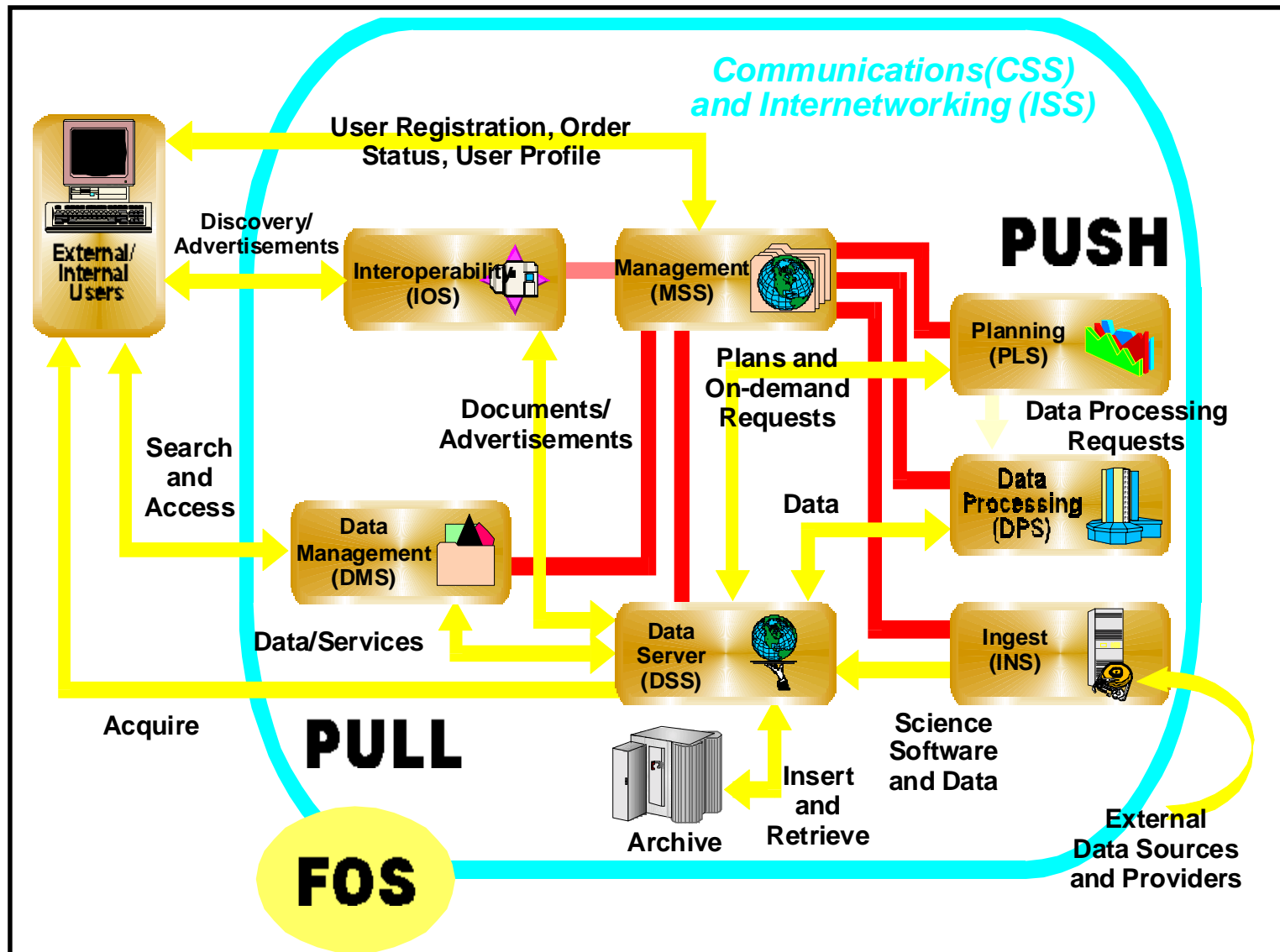
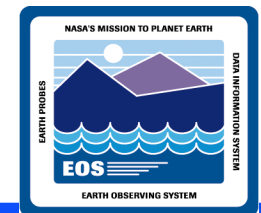
Major SSI&T Functions V2



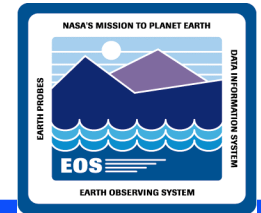
Function		Release VERSION 2.0
System Operation		All servers must run and communicate with each other; bring up manually, or use ECSAsisst tool
Ingest Ancillary Data Granules		Ingest GUI, ESDTs must be visible to ADV server.
ESDT Insert		Use Ingest
ESDT Verification		verify through ADV
DAP, SSAP Insert		Use Ingest
PDPS Database Population		More attributes, production rules
PGE Operation		When all data is available; DPR activated. No automatic reprocessing Complex chaining through production rules.
File Access		verify presence through ADV; ftp from SDSRV; access to multiple sites
Multi-file Granule Support		Files inserted together, accessed as a single granule.
Subscription Management		Subscription Manager

Table 1. Major SSI&T Procedures for Version 2.

Communications and Internetworking



The ECS Assistant



Using ECS Assistant to Start Up / Shut Down Servers

Subsystem Server Start Up / Shut Down

Monitoring the Distributed Computing Environment (DCE)

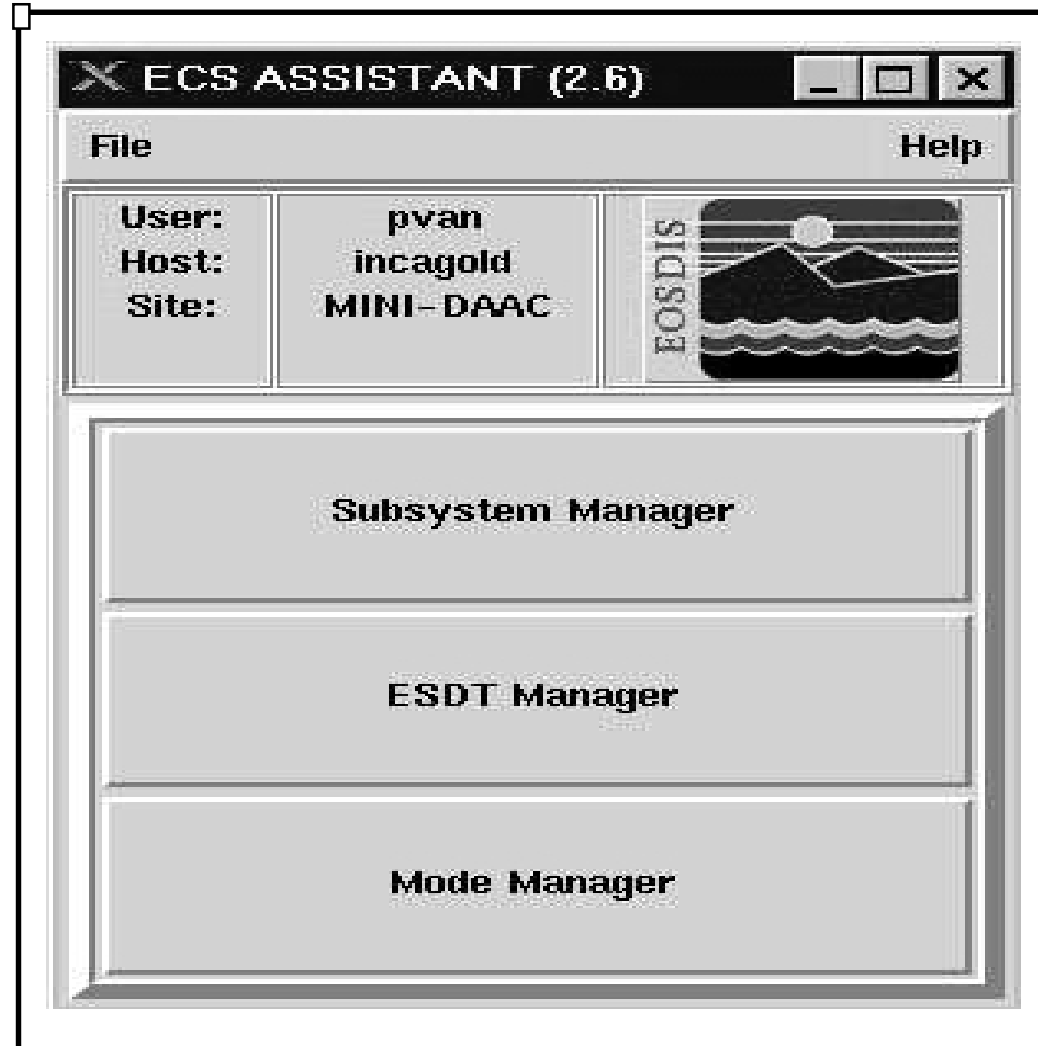
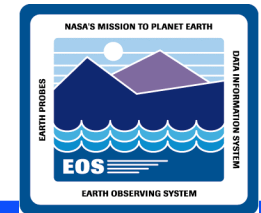
Using ECS to Perform System Monitoring

Using ECS Assistant to Open / View Log Files for a Selected Server

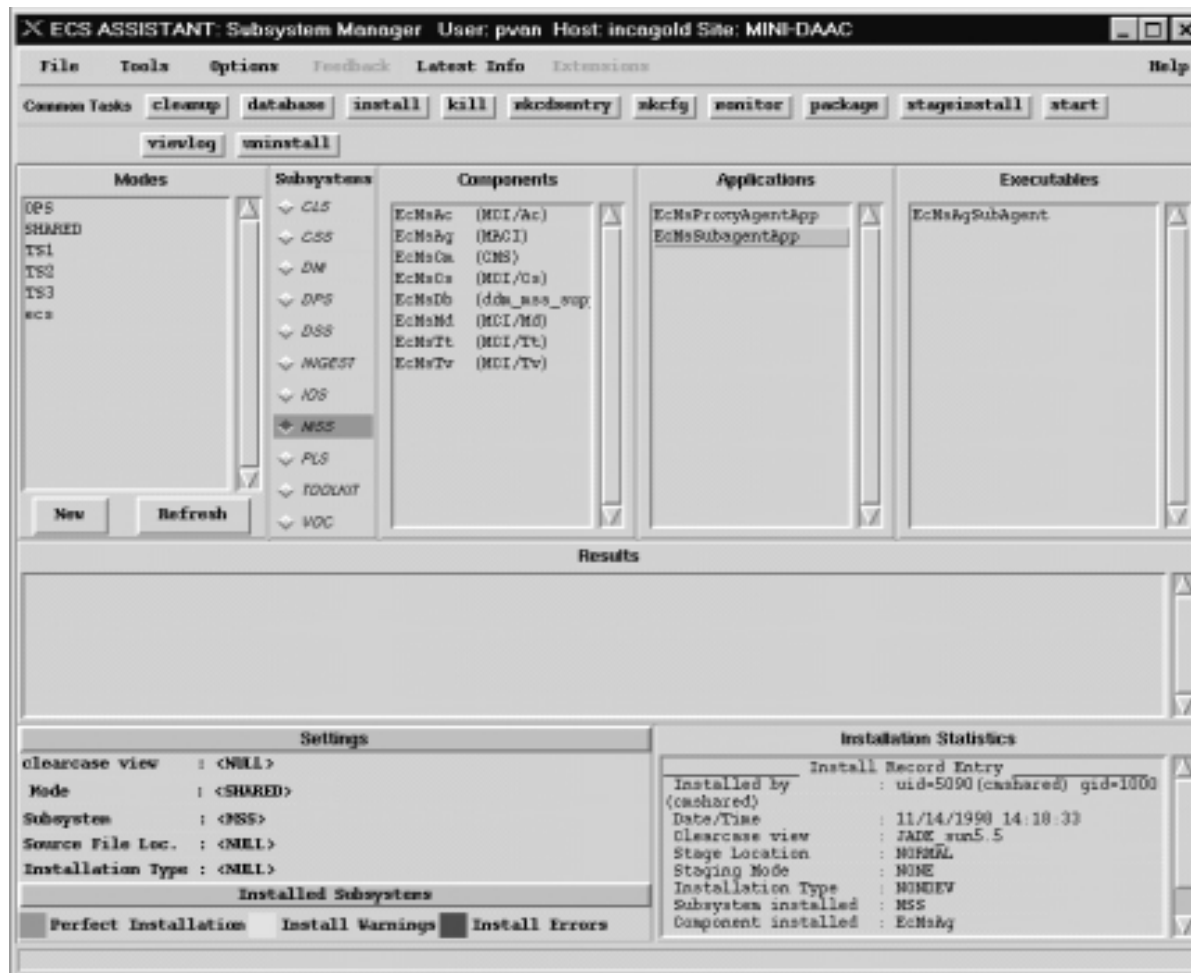
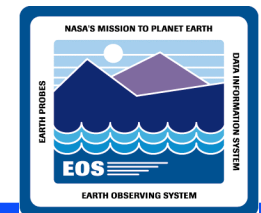
Using ECS Assistant to Monitor Server Status

Using ECS Assistant to View ESDTs

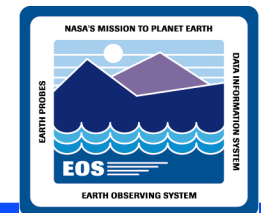
ECS Assistant GUI



Subsystem Manager GUI



Server Monitor GUI



ECS Monitor

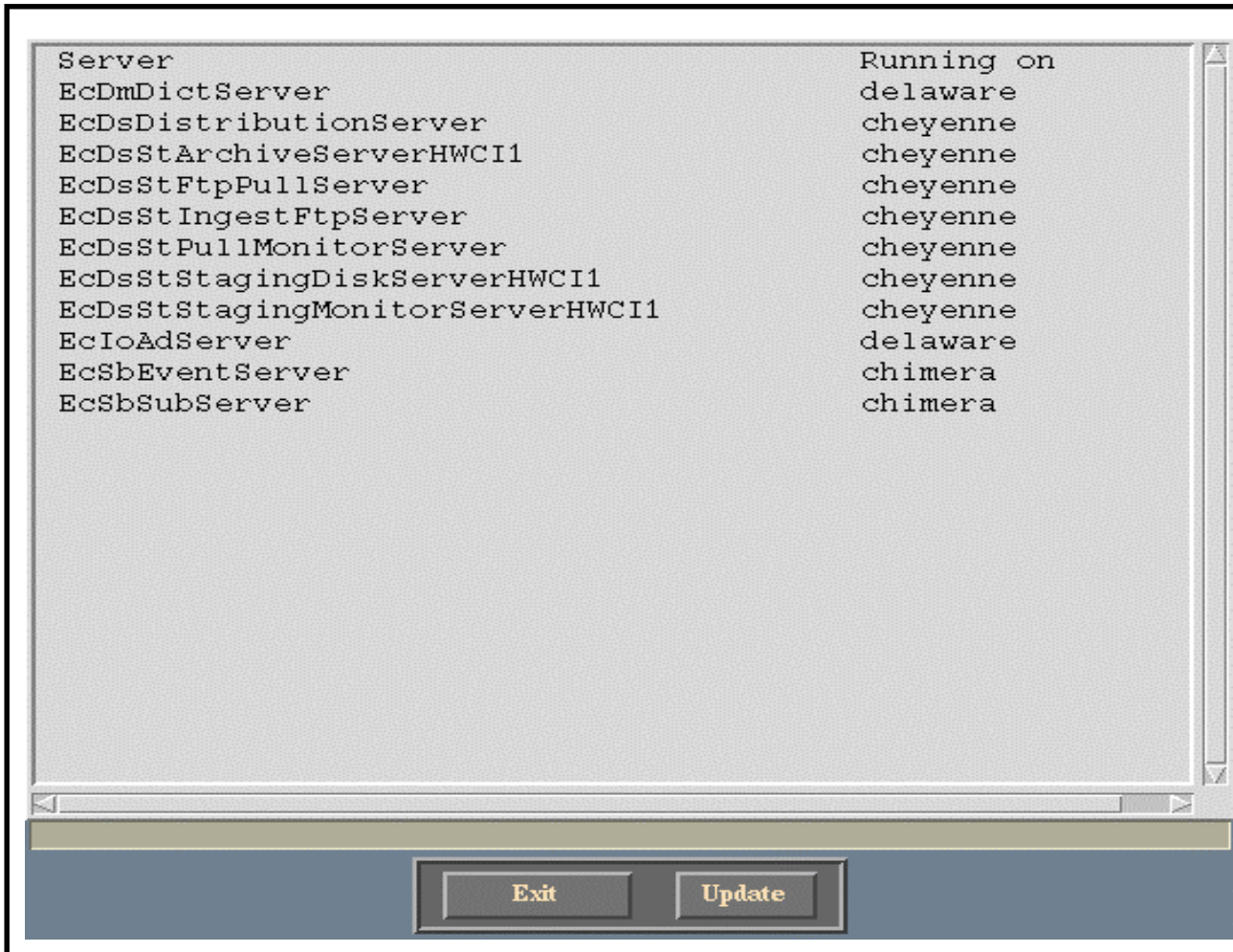
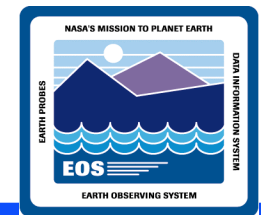
Mode: **RCCCO** Hostname: **cheyenne**
Subsystem: **DSS** User Id: **ssinghal**
Component:

Wed Nov 12 16:06:42 EST 1997

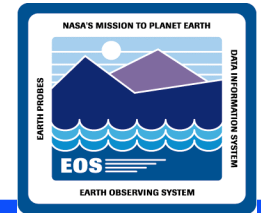
Exit Update Now cdsping all servers... ☒ Auto Update

SERVER	STATUS	PID	USERID	START TIME
EcDsScienceDataServer	UP	26184	szobair	1997/11/12 15:30:45
EcDsHdfEosServer	DOWN			
DsStArchiveServerMain	UP	14074	szobair	1997/11/12 14:18:05
DsStFtpDisServerMain	UP	14096	szobair	1997/11/12 14:18:06
DsStFtpIngestServerMain	UP	14091	szobair	1997/11/12 14:18:06
DsStStagingDiskServerMain	UP	14104	szobair	1997/11/12 14:18:07
DsStStagingMonitorServerMain	UP	14079	szobair	1997/11/12 14:18:05
DsStPullMonitorServerMain	UP	14071	szobair	1997/11/12 14:18:05
EcDsDistributionServer	UP	14380	szobair	1997/11/12 14:18:39

cdsping GUI



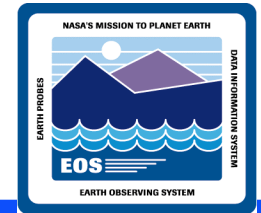
Preparation and Setup



Preparation for SSI&T is a cooperative effort by M&O and SSI&T

- **M&O Activities for Preparation and Setup:**
 - Setup of user accounts.
 - Setup ClearCase VOB.
 - Installation of Software Drops
- **SSIT Preparation and Setup:**
 - Examine .cshrc file.
 - Set additional environmental variables.
 - Source additional setup files.
 - Verify access to ClearCase VOB.
 - The Green Book SSI&T Operational Procedures provides a road map to get from a Delivered Algorithm Package to Science Software which is integrated into ECS and ready for production.
 - Procedures are ordered in a logical sequence.
 - Some deviation will be required for actual work at each DAAC.

Science Software Configuration Management



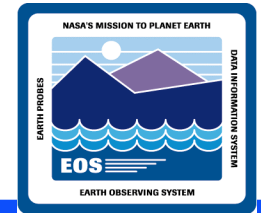
ClearCase - COTS tool for configuration management of science software.

Invocation Methods - Command line or Graphical User Interface (GUI).

Key Terms -

- **Versioned Object Base (VOB) - a mountable file system which stores version controlled data in directories and files.**
 - **Any Unix file : source files, script files, documents, spreadsheets.**
 - **Binary data and object files are not stored efficiently.**
 - **Usually accessed with standard UNIX and ClearCase Tools.**
- **View - A working context for a user. Used to access any VOB to make files and directories visible and accessible. Comprised of a storage area for checked out files.**
- **Element - File or directory in ClearCase VOB.**

Creating and Setting a View



Naming Conventions

- Provides file/directory names for locating directories or files.
- Key Names
 - ViewName - name of the user's view.
 - PathName - pathname is the path to the VOB directory.

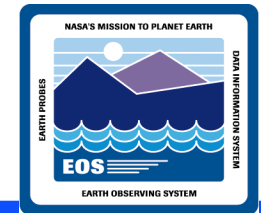
Scope

- Needs to be created only once.
- Must be set at beginning of each user session.

Key Assumptions

- ClearCase is available.
- A VOB has been created.

Creating a View

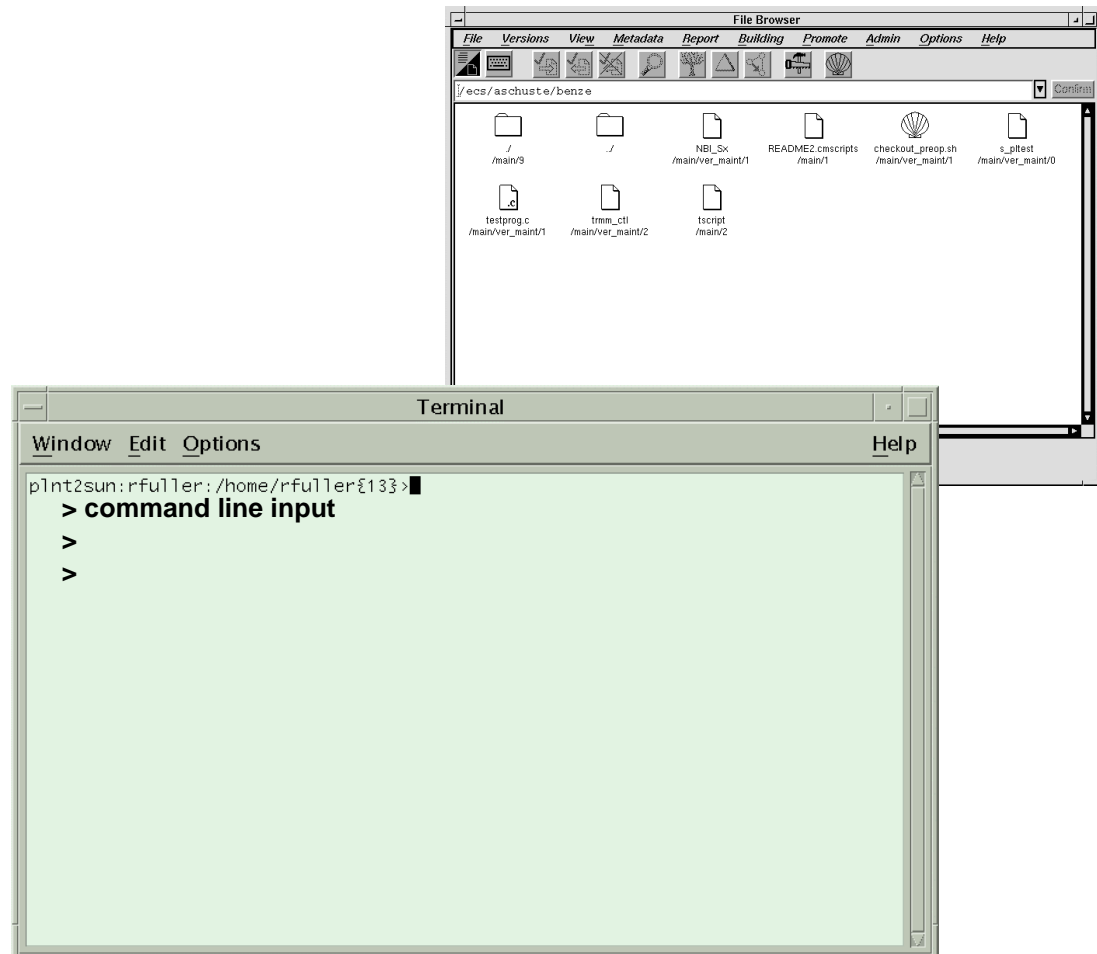


Access ClearCase by typing:
cleartool

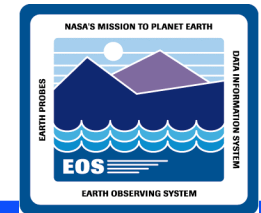
Create a view by typing:
mkview -tag *ViewName*
ViewPath/ViewName.vws

View is created named
ViewName

ViewName = name of view
ViewPath = path to view directory
vws = file extension



Setting a View

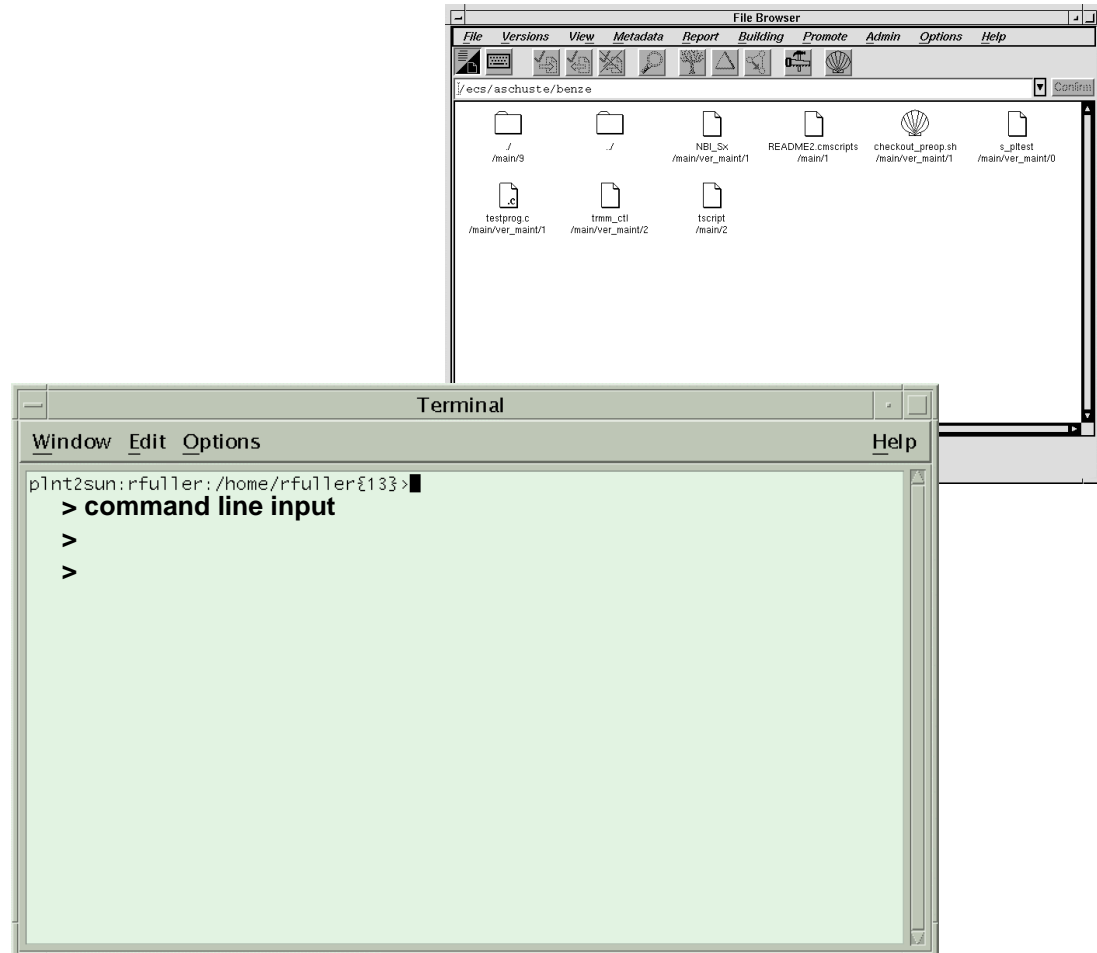


Access ClearCase by typing:
cleartool

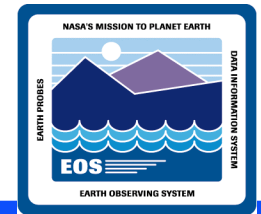
Set a view by typing:
setview *ViewName*

View is set to ***ViewName***

ViewName = name of view



Entering a New Directory into ClearCase



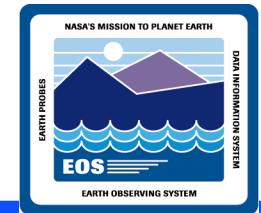
Key Assumptions

- A VOB and subdirectory has been created to hold the file
- A view has been created.

ClearCase Commands

- **cleartool setview *ViewName*** - Launches ClearCase and displays the user's view.
- **cd *PathName*** - Changes directory to a subdirectory in the VOB.
- **cleartool checkout -nc .** - Checks out a directory from ClearCase.
- **cleartool mkdir -nc *DirName*** - Creates a new directory (subdirectory).
- **cleartool checkin -nc *DirName*** - Checks new directory into ClearCase.
- **cleartool checkin -nc .** - Checks the current directory into ClearCase.

Creating a Directory



Access ClearCase by typing:
cleartool setview *ViewName*

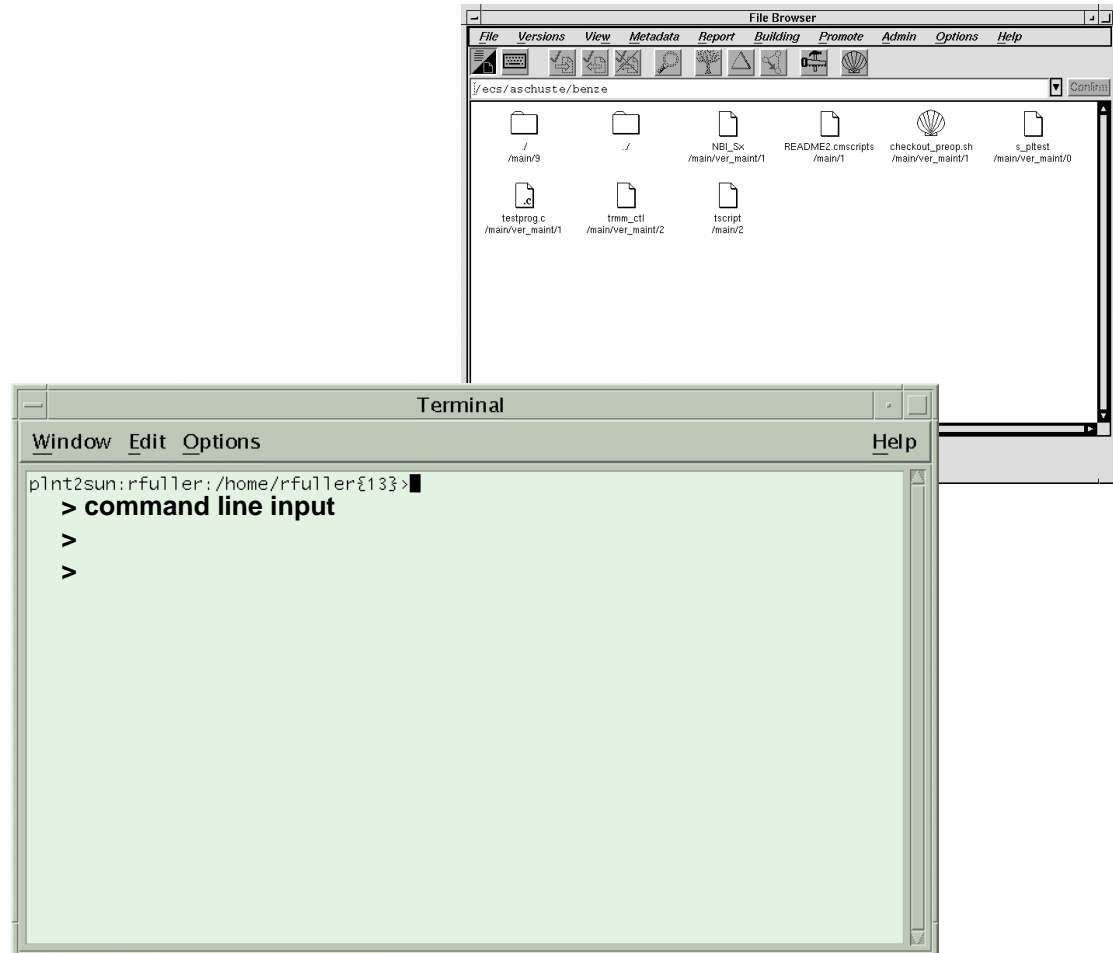
Change Directories by typing:
cd *PathName*

Checkout directory by typing:
cleartool checkout -nc .

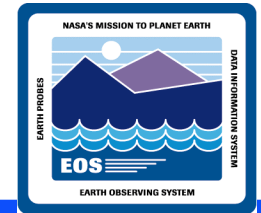
Create a new directory by typing:
cleartool mkdir -nc *DirName*

Checkin a directory by typing:
cleartool checkin -nc *DirName*

A new directory has been
created and checked into
ClearCase.



Entering a Single File into ClearCase



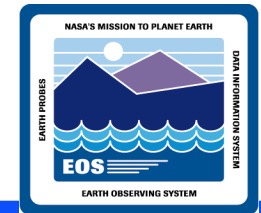
Key Assumptions

- A VOB and subdirectory has been created to hold the file
- A view has been created.

ClearCase Commands

- **cleartool setview *ViewName*** - Launches ClearCase and displays the user's view.
- **cd *PathName*** - Changes directory to a subdirectory in the VOB.
- **cp *FilePath/FileName* .** - Copies file from current to VOB directory.
- **cleartool checkout -nc .** - Checks out the current directory.
- **cleartool mkelem -nc *FileName*** - Creates a new element/file.
- **cleartool checkin -nc *FileName*** - Checks the file into ClearCase.
- **cleartool checkin -nc .** - Checks the current directory into ClearCase.

Entering a Single File into ClearCase



Access ClearCase by typing:
cleartool setview *ViewName*

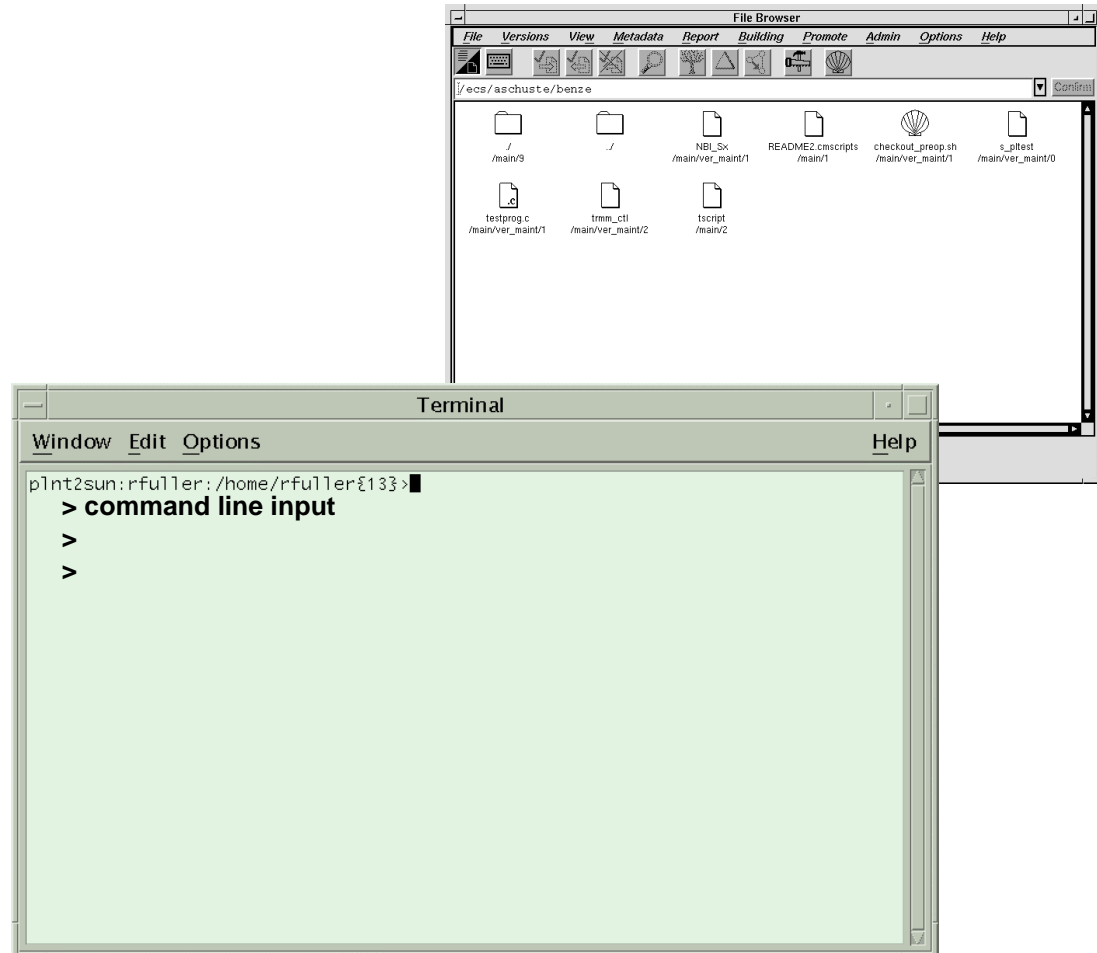
Change Directories by typing:
cd *Pathname*

Checkout directory by typing:
cleartool checkout -nc .

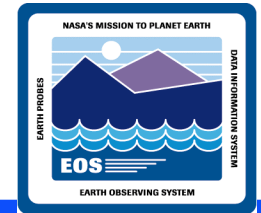
Create a new element by typing:
cleartool mkelem -nc *FileName*

Checkin a file by typing:
cleartool checkin -nc *FileName*

Checkin a directory by typing:
cleartool checkin -nc .



Importing Files into ClearCase



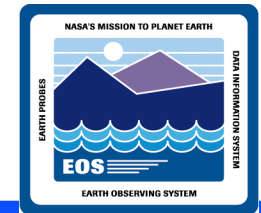
Key Assumptions

- DAAC SA required to complete this procedure.
- A VOB and subdirectory has been created to hold these files.
- No object files or executables exist in the directory.
- The PGE was received with a directory structure that contains various types of files.
- The PGE directory structure will be maintained.

ClearCase Commands

- `cd ParentDir` - Changes directory to the parent directory of the directory structure to be brought into ClearCase.
- `clearcvt-unix -r DirName` - Creates a conversion script to import everything in *DirName* directory and everything below it to ClearCase.
- `cvt_script` - Name of created script and command to run the script to place all elements under ClearCase.

Importing Multiple Files into ClearCase



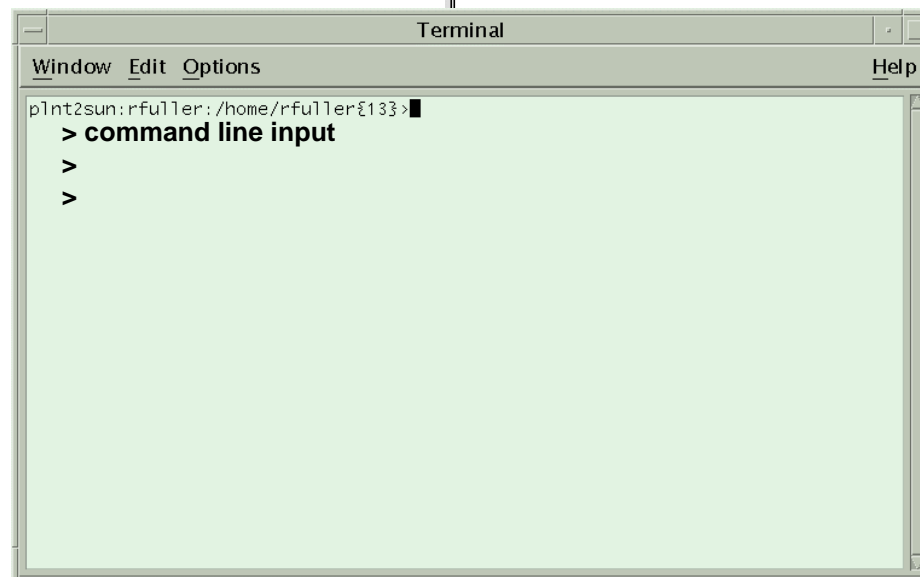
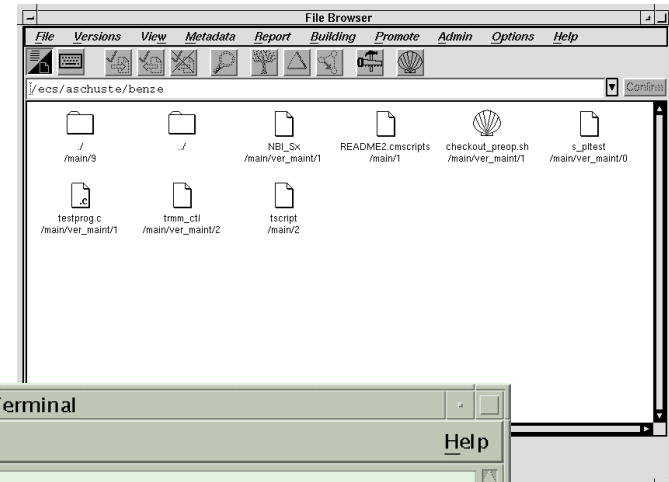
Change directories to parent
of directory structure:
cd *ParentDir*

Create a conversion script :
clearcvt-unix -r DirName

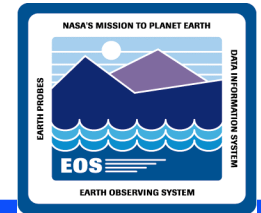
The output script is named:
cvt_script

Change directories in VOB by typing:
cd *Pathname*

Copy files into ClearCase by typing
the script: **cvt_script**



Checking Out an Element from ClearCase



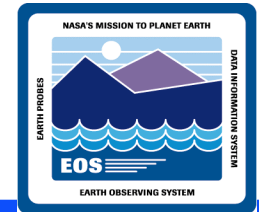
Key Assumptions

- A VOB and subdirectory has been created to hold the file.
- A view has been created.

ClearCase Commands

- **cleartool setview *ViewName*** - Launches ClearCase and displays the user's view.
- **cd *PathName*** - Changes directory to a subdirectory in the VOB.
- **cleartool checkout -nc .** - Check out a directory from ClearCase
- **cleartool checkout -nc *FileName*** - Check out a file from ClearCase.
- **cleartool uncheckout** - Cancels a checkout.

Checking Out an Element from ClearCase

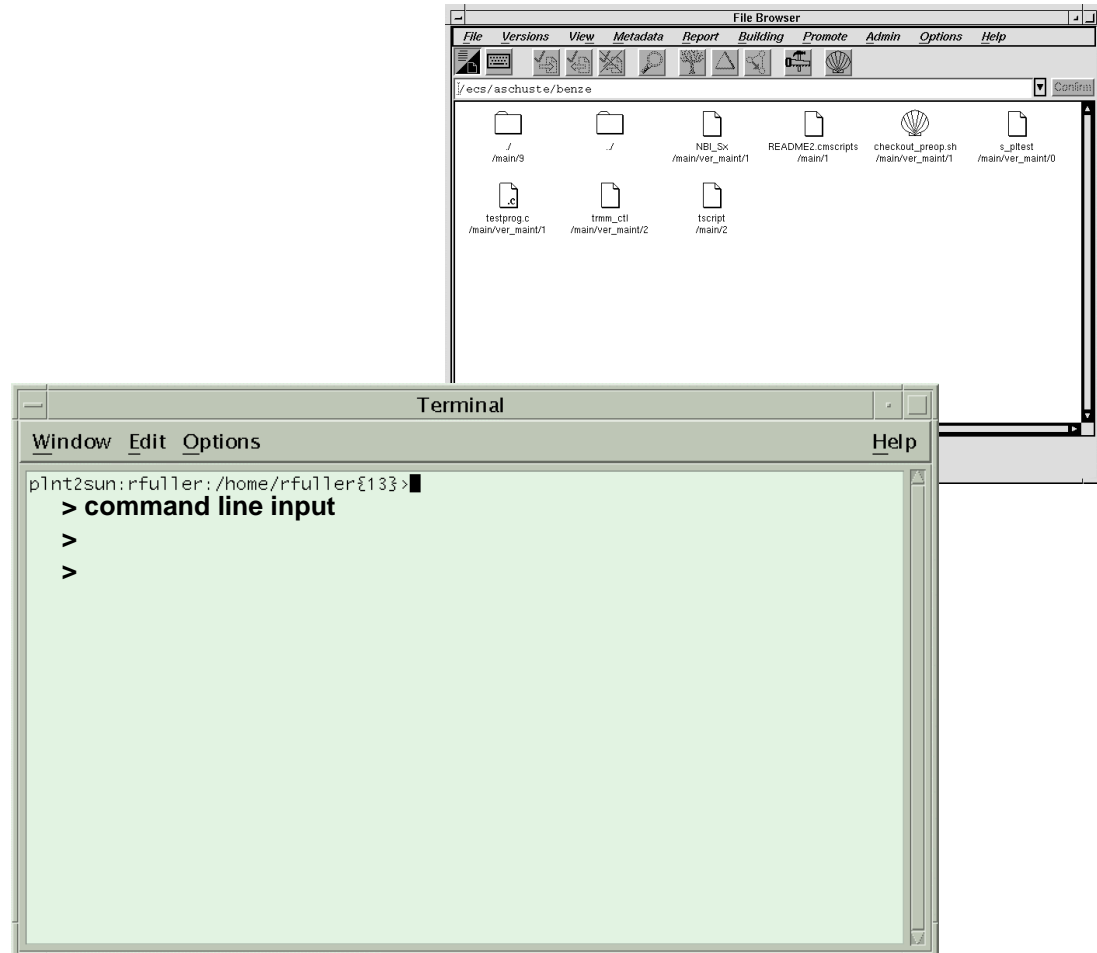


Access ClearCase by typing:
cleartool setview *ViewName*

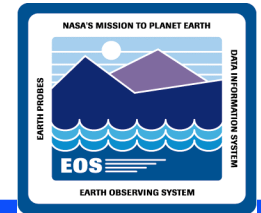
Change directories in VOB by typing:
cd *Pathname*

Checkout directory by typing:
cleartool checkout -nc .

Checkout file by typing: **cleartool
checkout -nc *FileName***



Entering a Modified Element into ClearCase



Key Assumptions

- A VOB and subdirectory has been created to hold the file.
- A view has been created.
- A file has been checked out from ClearCase and modified.

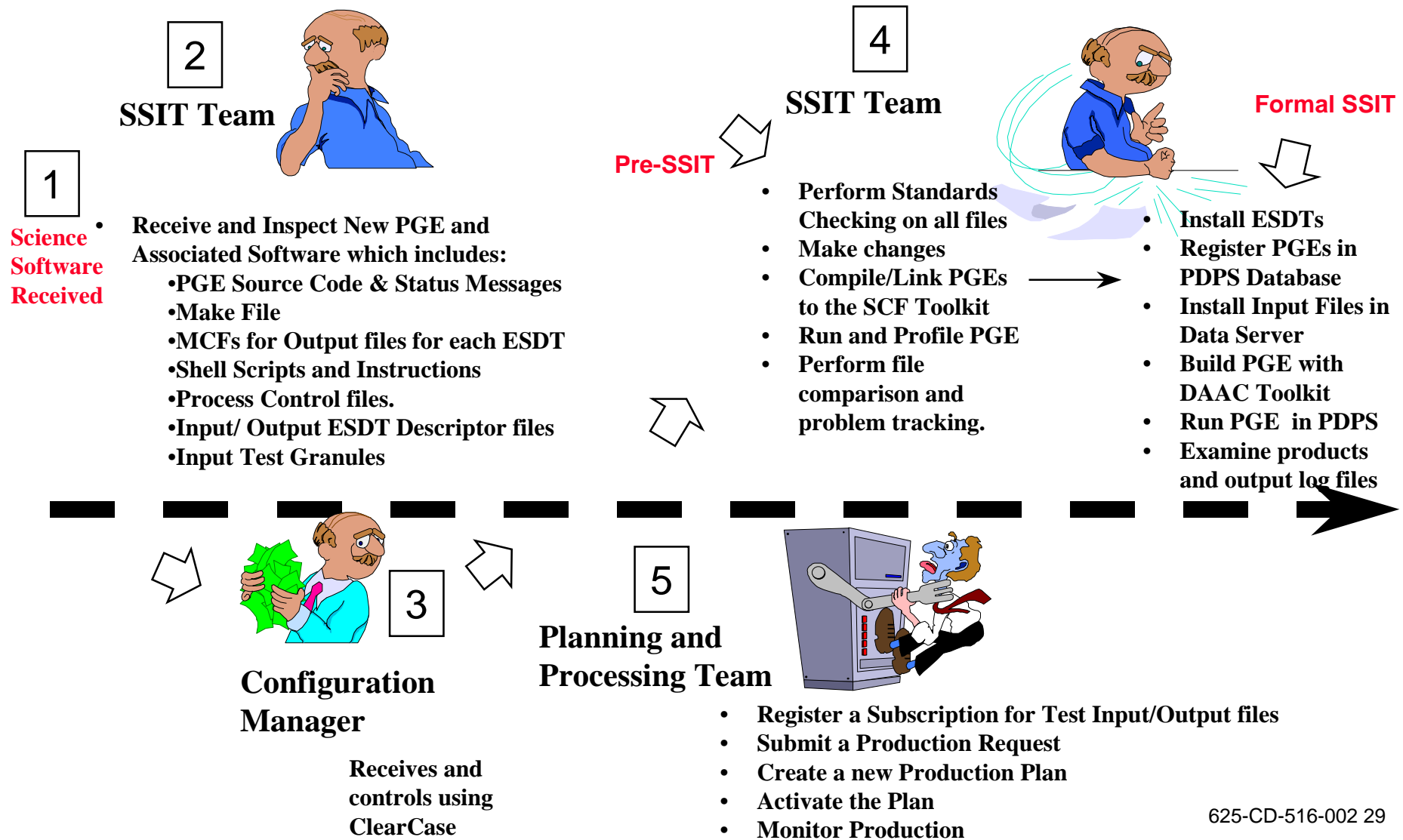
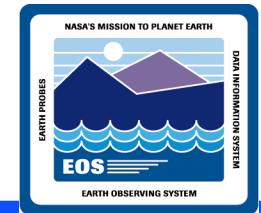
ClearCase Commands

- `cleartool setview ViewName` - Launches ClearCase and displays the user's view.
- `cd PathName` - Changes directory to a subdirectory in the VOB.
- `cleartool checkin -nc FileName` - Checks a modified file into ClearCase.

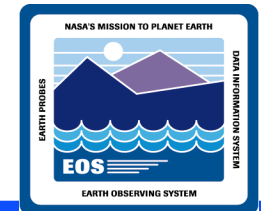
Note

- DAAC policy may require a comment on entry of modified element into ClearCase.

SSI&T Process Overview - The Big Picture

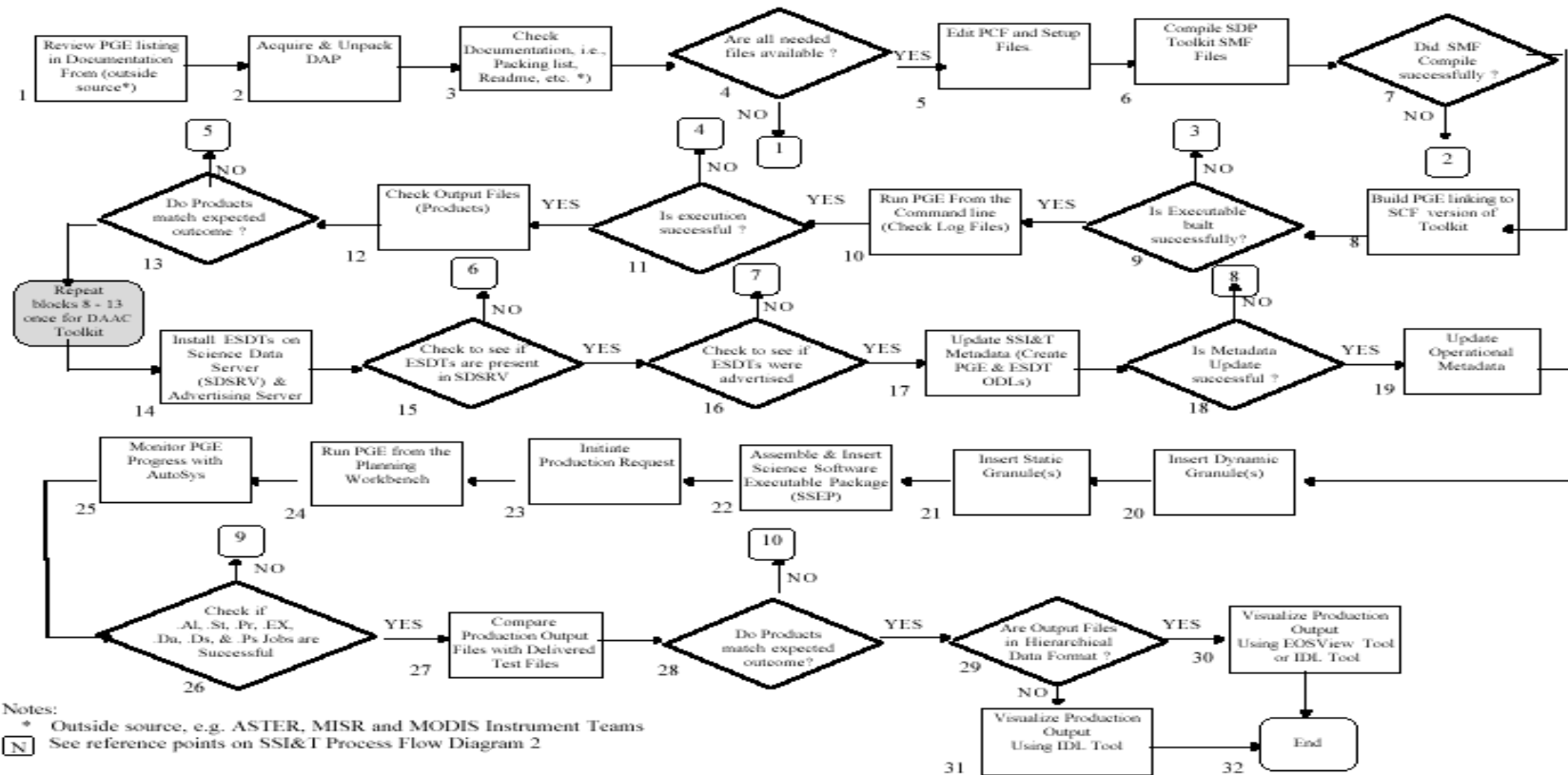


SSI&T PROCESS FLOW DIAGRAM 1

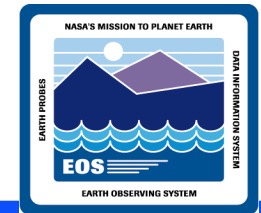


SSI&T PROCESS FLOW DIAGRAM 1

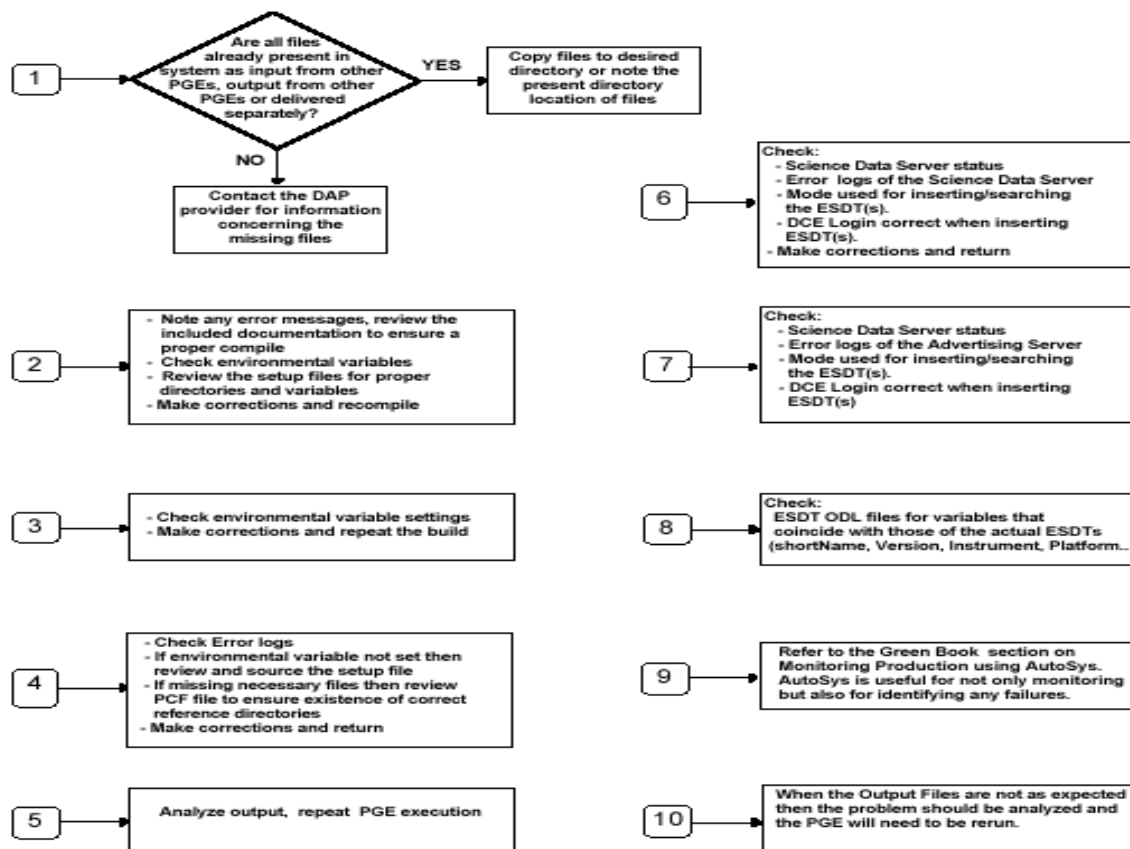
No.: SO-1-003 Rev.: Original Page 6 of 7



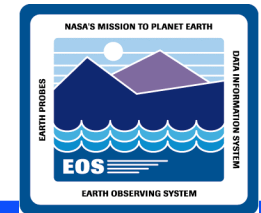
SSI&T PROCESS FLOW DIAGRAM 2



SSI&T PROCESS FLOW DIAGRAM 2



Acquiring the Delivered Algorithm Package by FTP



Log into **sgi machine**

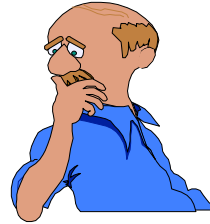
Type **cd *PathName***

Type **ftp machine
*IPaddress***

Type **user name
and *password***

Type **cd *PathName***
where DAP is located

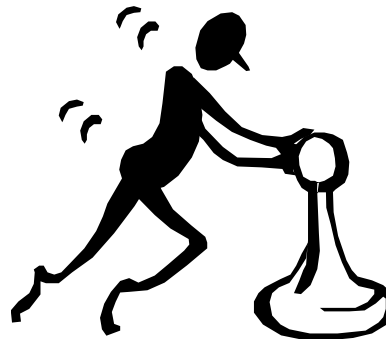
Type **binary** and
get *DAPFilename*



SSIT Team

Note: Tapes are also used to transfer files. Usually performed by the SA.

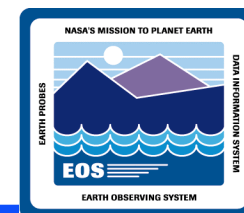
**sgi machine
designated for SSI & T**



FTP Transfers files to the desired directory within the **sgi machine**



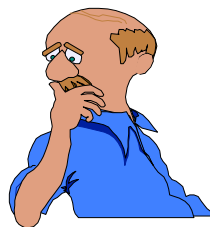
Unpacking the Delivered Algorithm Package



Log into **sgi**
machine

Type **cd**
UnpackPathName

Type ***tar xvz***
PackedDAP



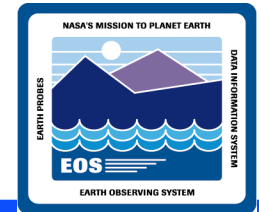
SSIT Team

The tar file is unpacked in
the desired directory
within the **sgi machine**.

DESTINATION: INGEST

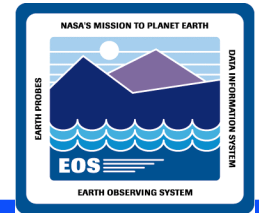


Delivered Algorithm Package



- **Typical Contents of DAP:**
 - Source code
 - Message files.
 - Make or build files.
 - Shell Scripts
 - Process Control File (PCF).
 - Metadata Configuration File information to build an (MCF).
 - Instructions for building and running PGE.
 - New metadata and ESDT Descriptor files.
 - Test data for input and comparisons.

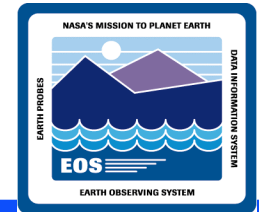
Training Example DAP MODIS PGE07



All files: 5 min data

Training Example DAP

(1 / 3)



Filename

Description

SDSRV:

DsESDTMoMOD03.001.desc

Input ESDT descriptor file

DsESDTMoMOD02HKM.001.desc

Input ESDT descriptor file

DsESDTMoMOD35_L2.001.desc

Input ESDT descriptor file

DSESDTMoMOD10_L2.001.desc

Output ESDT descriptor file

libDsESDTMoMOD03.001.Sh.so

Shared library for input ESDT

libDsESDTMoMOD02HKM.001.Sh.so

Shared library for input ESDT

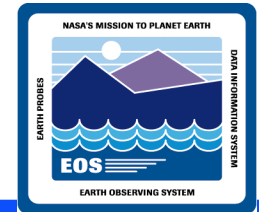
libDsESDTMoMOD35_L2.001.Sh.so

Shared library for input ESDT

libDsESDTMoMOD10_L2.001.Sh.so

Shared library for output ESDT

Training Example DAP (2 / 3)



Filename

Description

PDPS:

PGE07.tar

PGE executable

PGE07.tar.met

Target MCF for PGE executable

PGE_PGE07#1.0#01.odl

ODL for PGE07

ESDT_ MOD03#2.0.odl

ODL file for binary input granule

ESDT_ MOD02HKM#2.0.odl

ODL file for binary input granule

ESDT_ MOD35#2.0.odl

ODL file for binary input granule

ESDT_ MOD10_L2#2.0.odl

ODL file for binary output granule

MOD02HKM.A1996218.1555.002.hdf

Binary input data granule

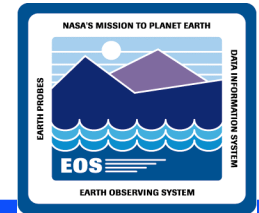
MOD03.A1996218.1555.002.hdf

Binary input data granule

MOD35_L2.A1996218.1555.002.hdf

Binary input data granule

Training Example DAP (3 / 3)



Filename

Description

To be generated at run time:

MOD02HKM.A1996218.1555.002.hdf.met

Target MCF for binary input granule

MOD03.A1996218.1555.002.hdf.met

Target MCF for binary input granule

MOD35_L2.A1996218.1555.002.hdf.met

Target MCF for binary input granule

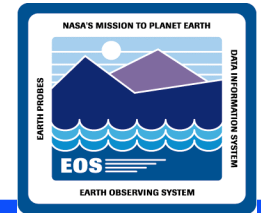
MOD10_L2.A1996218.1555.002.mcf

MCF for output product

MOD10_L2.A1996218.1555.002.mcf.met

Target MCF for status

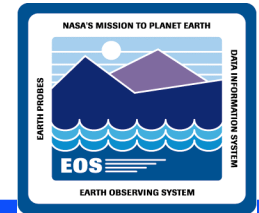
SSIT Manager



Provides a common interface to the SSI&T software tools and manages their operation

- **Setup SSI&T Manager and checklist.**
- **Open xterm session.**
- **Code Analysis.**
- **Office Automation Tools.**
- **Standards Compliance.**
- **Product Examination using EOSView and IDL.**
- **File Comparison in HDF, binary or ASCII format.**
- **Edit Text file.**
- **Initialize and Update PDPS database.**
- **Data Server Access.**
- **Additional information on SSI&T tools used by the DAAC operations specialist are found in Version 2.0 Operations Tools Manual 609-CD-003-003, section 4.5..**

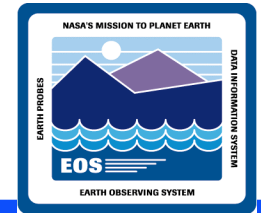
Setup of SSIT Manager



Configuration of Environment

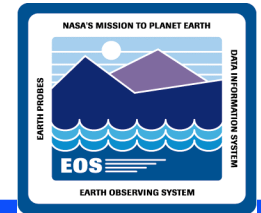
- **SSIT Manager runs only on Sun platforms in the subsystem DPS**
- **User makes a local copy of a Process Control File (PCF) for SSIT Manager and repeat same for a sample checklist.**
- **To setup the environment for the SSIT Manger, execute the procedures steps tht follow: Note that in the following, EcsCustomSW is normally in the directory /usr/ecs/TS1/CUSTOM on the AIT Sun: (This procedure was tested by telnet t1ais01, ID:, pw: At a UNIX prompt on an AIT Sun, (type**
 - setenv ECS_HOME /usr/ecs**
 - **cp /usr/ecs/{mode}/CUSTOM/data/DPS/EcDpAt.pcf**
 - **\$HOME/mySSITpcf, press Return.**
 - **setenv PGS_PC_INFO_FILE \$HOME/mySSITpcf, press Return.**
 - **check env for proper home path.**

Setup of SSIT Manager Continued



- type `cd /usr/ecs/mode/CUSTOM/utilities`, press Return.
- setenv `<mode>`
- Type in: `EcDpAtMgrStart <mode> &`
- This invokes the SSIT Manager GUI which should be displayed.

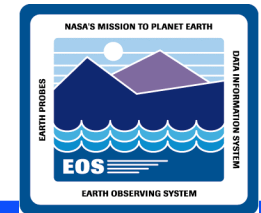
Setup of Checklist for SSIT Manager



Steps to Setup the SSIT Manager Checklist for Use in SSI&T

- From the SSIT Manager, click on the Tools menu, then choose Product Examination, then EOSView. The EOSView GUI will be displayed.
- Additional procedures are listed in the Training Manual vol 16.

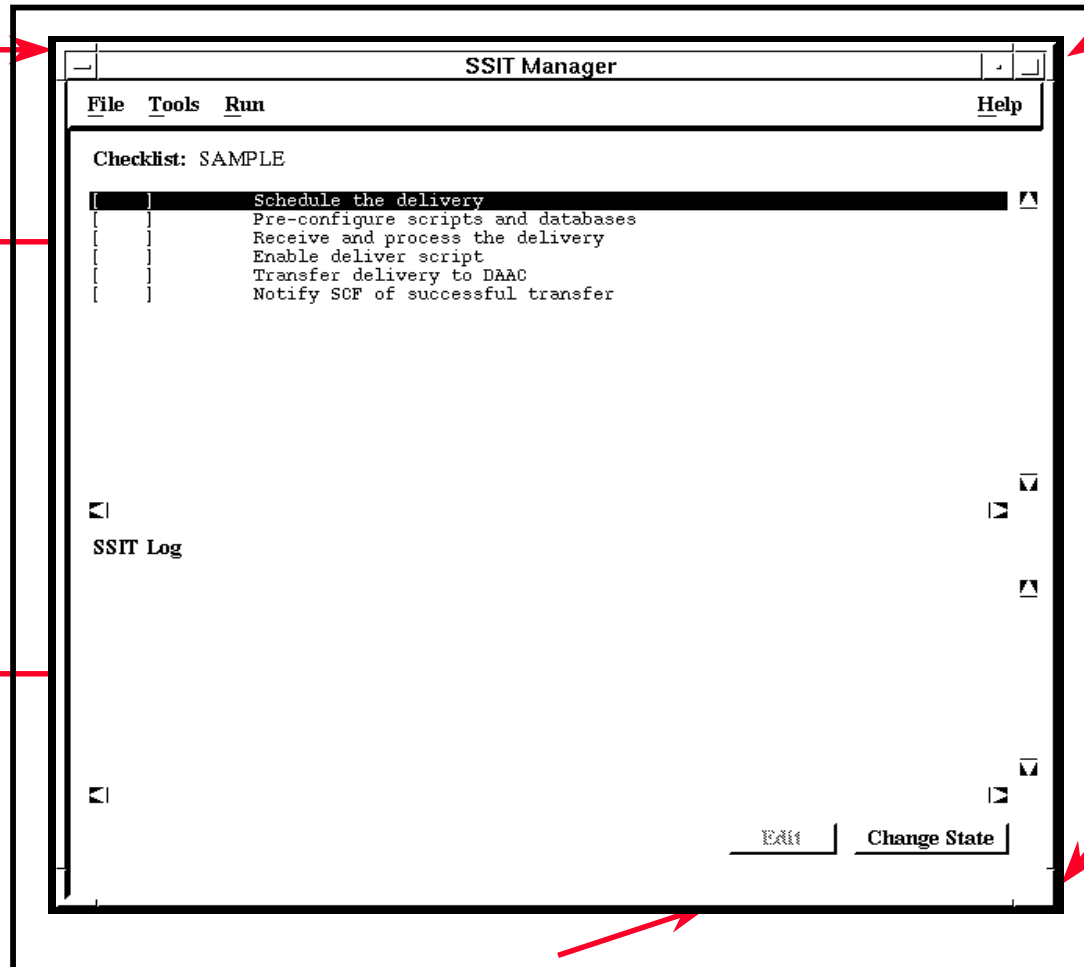
SSIT Manager GUI



Menu Bar.
Allows access to
SSI&T Tools

Checklist Pane.
List set of steps
to be completed

Log Pane:
Log of activities
accomplished

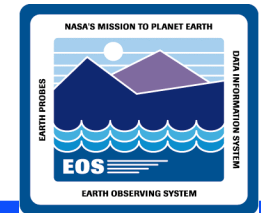


Help: Provides
access to help
features

Change State:
Button allows
Checklist state to
Toggle

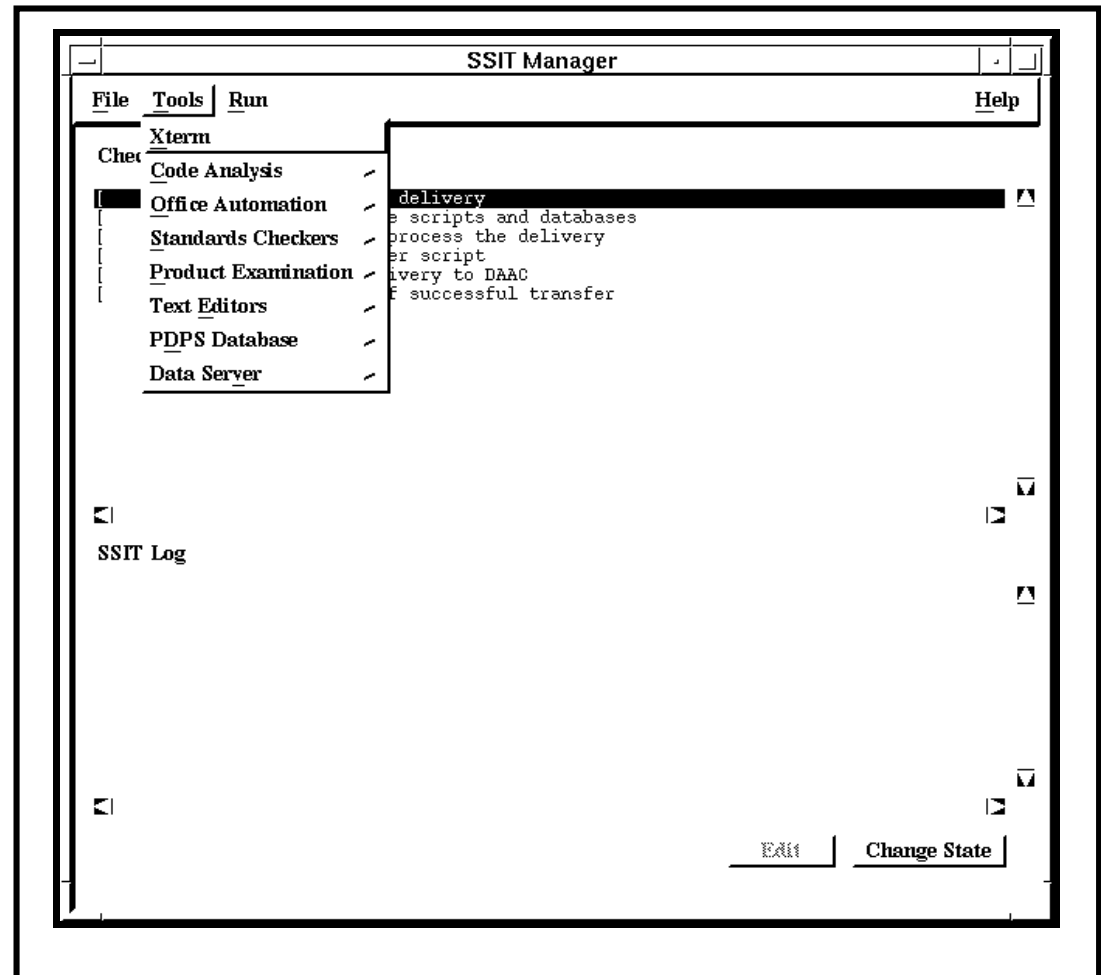
Edit: Button allows Checklist
to be edited

SSIT Manager Tools

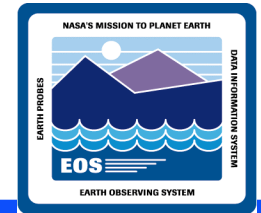


Tools:

1. **Xterm:** Starts an Xterm window session
2. **Code Analysis:** Performs static code analysis
3. **Office Automation:** MS Windows, MS Office, MS Excel
4. **Standards Checkers:** Prohibited Function & Process Control File Checkers, ForCheck, Prolog Extractor
5. **Product Examination:** File Comparison Tools and EOSView
6. **Text Editors:** Emacs or Xedit Tools
7. **PDPS Database:** PCF ODL Template Tool, Science Metadata & Opnl Metadata Update
8. **Data Server:** Register Subscription, Insert Static, Insert Test Dynamic, Insert EXE TAR



Standards Checking

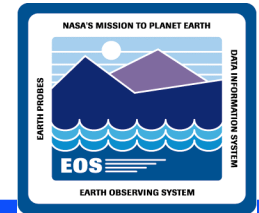


Purpose: Verify that the source files of a PGE are compliant with the ESDIS Data Production SCF Standards and Guidelines.

Key Terms:

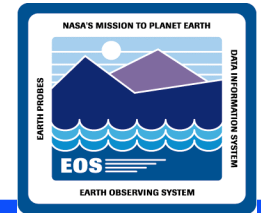
- **SDP Toolkit**
 - provides an interface to the ECS system.
 - allows science software to be portable to different platforms.
 - reduces redundant coding at the SCF.
 - provides value added functionality for science software development.

Standards Checking (cont.)



- **Mandatory SDP Toolkit Functions**
 - **Error and Status Message Facility (SMF).**
 - **Process control Tools.**
 - **Generic Input/Output Tools.**
 - **Memory Allocation Tools.**
- **Optional SDP Toolkit Functions**
 - **Ancillary Data Access.**
 - **Celestial Body Position Coordinate System Conversion.**
 - **Constant and Unit Conversion.**
 - **IMSL.**

Standards Checking (cont.)



Steps for Standards Compliance

FORTRAN 77 - On the AIT Sun.

Source FORCHECK setup file.

Create FORCHECK run script.

Invoke FORCHECK run script.

Examine the list file.

Fortran 90 and C - On the SDPS SGI.

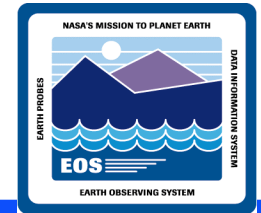
Set environment to appropriate SDP Toolkit.

Compile the PGE using compiler flags.

Examine the list file.

Ada - Compile using COTS Verdex Ada Development System or GNU C Compiler, gcc.

Prohibited Function Checker



- **Used to check source files for the occurrence of functions that are prohibited in the ECS DAAC production environment.**

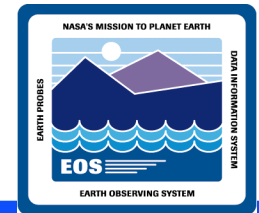
Key Procedure Commands

- **SSIT Manager**
 - **Tools → Standards Checkers → Prohibited Function Checker**

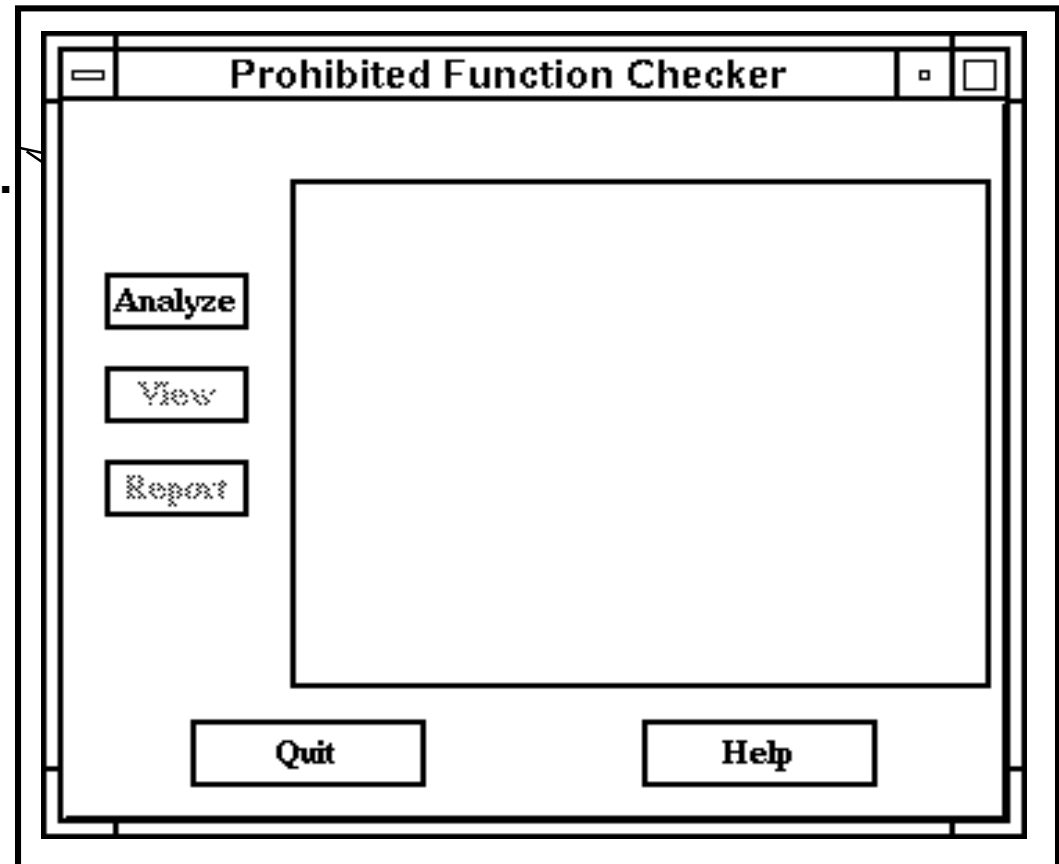
Run the Analyze from GUI.

- **Highlight files to be analyzed.**
- **Run checker.**
- **Generate report.**
- **Save and examine report.**

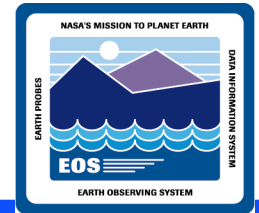
Prohibited Function Checker GUI



Highlight files to be analyzed.
Run checker.
Generate report.



Checking Process Control Files



Key Procedure Commands.

- **SSIT Manager**
 - **Tools → Standards Checker → Process Control File Checker**

Run the PCF Checker GUI.

- **Select the directory**

The PCFs must be checked to verify that they are syntactically correct and contain all the information for the PGEs to run within the ECS DAAC production environment.

Select one PCF and select the Check PCF button.

- **Save or print the results file and examine results.**

Checking Process Control Files

